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CLUSTERS AS A FORM OF SPATIAL ORGANISATION OF ECONOMIC ACTIVITY: THEORY AND PRACTICAL OBSERVATIONS

This article aims at explaining the clustering of economic activity using instruments of new institutional economics, taking into account well-known descriptive characteristics of the cluster, as well as recent developments in research on hybrid institutional agreements, primarily, the research conducted by Michael Porter, Claude Ménard and others.

Key words: cluster, region, new institutional economics, cluster classification.

Introduction

Modern research on clusters triggers a discussion of numerous issues – not only positive ones, but also normative, related to the development of economic policy. In this connection, one of the fundamental theses, explaining the topicality of cluster research resolves itself into the following statement: an increase of competitiveness at the level of a sector and/or a region can be achieved only by joint effort of a number of companies that, competing or cooperating in the framework of vertical or conglomerate agreements, create a local business environment and thus, find new, more effective ways of using the existing resources as well as create new ones. It is these joint efforts that allow various actors to employ key methods of increasing cluster competitiveness, i.e shared resources and common skills.

Thus, it is important to define, to which extent cooperation and interaction between Russian companies meet the definition of a cluster as a form of coordination, including the coordination of the activity of companies competing in the same market (they manufacture similar products and have similar geographical position). This article describes the results of a survey of companies-participants of a certain cluster[1]. It should be mentioned that since the survey, used by the author, cannot generally be considered as a representative one in terms of research on coordination mechanisms of Russian companies, the conclusions made in the article should be interpreted as initial diagnostics and preliminary assessment only.

The article is mainly aimed at posing the problem of the application of the mechanisms of the new institutional economic theory; particular emphasis is laid on the application of the transaction cost theory to the object, descriptively characterised as a cluster.

1. Descriptive characteristics of a cluster

'Cluster' is a popular term that is associated in economics with competitiveness and public (first of all, industrial) policy, as well as with innovations and high technologies. At the same time, there is an evident lack of understanding of how a cluster is related to the forms of economic organisation, being objects of economic analysis and directly connected with the innovative development of economy.

It is not easy to define analytical boundaries of a cluster, though they are empirically evident. It is not surprising that an integral, synthetic cluster theory has not been developed yet [15, p. 3]. At the same time, the comprehension of a cluster as an object of public policy, aimed at increasing the competitiveness of an industry (industries) and/or a region, should be based on not necessarily ideal, but operational understanding of the nature of a cluster in its descriptive, rather than singular definition. Such

[1] This research was limited to two sectors of Russian industry: mechanical engineering, including motor industry, professional equipment, instrument engineering and electric locomotive construction (a traditional sector) and IT industry (an innovative, developing sector). The number of the regions was limited to three: the Kaluga region (Central federal district), the Nizhny Novgorod region (Volga federal district), and the Sverdlovsk region (Urals federal district). 60 people (including 32 company executive) were interviewed in the survey; other participants represented regional authorities, education and research institutions, and industrial parks.

definition could outline the forms and mechanisms of cluster development, avoiding its possible mistaking for an industrial park, a special economic zone, an industrial region, etc.

This approach helps to avoid two mistakes: identifying a cluster where it does not exist, and failing to see the existing cluster. This may lead to incorrect decisions in implementing both competition and industrial policy. Both cases may result in the loss of profit.

A number of research works [3; 4; 5, p. 176—177; 16] formulate important descriptive characteristics of clusters, which can be classified as follows:

1. *Localisation of enterprises:* immediate vicinity. It is important to understand to which extent each enterprise can make use of the resources located in the given territory and whether the mobility of these resources is limited or not. It particularly concerns labour force. If it were possible to imagine an enterprise that would use only absolutely mobile resources (as, for instance, information transmitted via the Internet, with some exceptions related to the peculiarities of information traffic), the definition of a cluster as a special form of economic organisation would be unreasonable. Thus, it is wrong to think that the absence of serious territorial limitations in terms of product mobility (for example, as in the case of software) is a sufficient reason for rejecting the possibility of clustering in this industry. We will give a number of examples showing that clustering in IT is still possible due to the inevitable specificity of the location of some resources.

The results of the above-mentioned survey (see Table 1) vividly illustrate these theses. The factors increasing the economic attractiveness of regions are given in Table 1. These factors help to understand what is important when locating an enterprise; the location of an enterprise can play an important role in the development of the regional economic policy. The absolute dominance and importance of labour force is striking, though it is, as we all know, limited in mobility, especially in Russia.

Table 1

Factors of economic attractiveness of regions

Factors	Percentage of respondents considering the factor as important, %	
	Mechanical engineering	IT industry
Natural resources	5	0
Labour force	*75*	*83*
Related industries	70	42
Large distribution area	35	33
Developed transport infrastructure	50	25
Developed business infrastructure (banking services, insurance services, etc.)	45	33
Policy of regional authorities	50	8
Favourable location in terms of logistics	50	25

Source: the survey results.

In this connection, one should pay attention to geographical and economic distances. The estimation of an economic distance should be done according to the transportation time needed to get from one point to another, or generally speaking, according to the alternative costs borne by economic entities.

2. *The belonging of enterprises to related industries and sub-industries* (maintaining a considerable degree of cluster element diversity). The interconnection of industries means not only the possibility to use similar resources, but also an intensive exchange of information on the peculiarities of organisation, business, and technology due to the interdependence of enterprises, which is reflected in a number of important features of institutional agreements. Another two important aspects, as it is shown below, are specific resources used by enterprises of the cluster, and positive externalities indicating special aspects of the interdependence of industries and sub-industries (see Table 1 “Related industries”).

3. *Close connections* (including those not established by agreements/contracts) of enterprises not only in the resource market (first of all, in the labour market), but also in the goods market. In other words, connections between enterprises are a) multi-aspect, not only in several goods markets, but also beyond several industries; b) basically informal. Thus, one may consider clusters in the format of multilateral institutional agreements - one of the most important features of hybrids, regarded as a combined form of cooperation and competition between economic entities. These characteristics do not only indicate some key aspects of the functioning of clusters, but also reveal the complexity of research on this topic, particularly the research done by the standard methods of statistical monitoring.

The survey showed that the interrelations between different categories of participants of formal and informal relations are not equally important in different industries (see Table 2).

Table 2

Importance of cooperation with different groups aimed at an increase in competitiveness

Cooperation group	Cooperation importance, %	
	Mechanical engineering	IT industry
Customers	80.0	91.7
Suppliers	80.0	33.3
Manufacturers in the same market (competitors)	30.0	66.7
Banks and other financial institutions	10.0	8.3
Regional authorities	25.0	25.0
Federal authorities	45.0	16.7

Source: the survey results.

4. *Competition between companies* involved in the development, production, and promotion of similar goods, or offering similar services. It should be mentioned that competition between participants of a cluster emerges not only in commodity markets, but also in resource markets. Cluster members cooperate in the context of complex intertwining of cooperation and competition, which is typical of hybrid forms of institutional agreements between market participants.

At the same time, other researchers offer a wider set of characteristics for describing a cluster. Thus, explaining the phenomenon of the furniture producing cluster in the Kaliningrad region, researchers emphasise the following features of the cluster development:

1) increasing number of furniture-producing enterprises;
2) enlargement of the sector leading enterprises;
3) geographical concentration of enterprises;
4) increase in export;
5) formation of the common “Kaliningrad furniture” brand;
6) diversification of production and the development of raw material processing;
7) learning from success stories and best experience;
8) more active participation in trade fairs;
9) intercompany cooperation.

The survey of IT industry representatives in the Nizhny Novgorod region shows that some descriptive characteristics of a cluster are clearly understood by the respondents:

“[a cluster] means that a company produces something somewhere and its supplier is situated in an adjacent building”.

Another interview gives a definition of a cluster based on the assessment of the situation in Nizhny Novgorod:

“…everybody’s located in the same place; employees communicate with each other all the time. So, everybody benefits. There appear insiders, everybody knows everything about everything and everybody. They know how the competitors are doing, and discuss the social policy. Maybe, some joint projects are still lacking.”

Another representative of this industry responds in a similar way, though placing a different emphasis:

“If we think that all organisations are located close to each other, then A is located nearby, you can reach B on foot and C is not far either. Employees don’t have to go far to have a job interview. Everybody knows everybody. We employ students from the same universities…”

It should be mentioned that the features of the cluster definition given above conform to the approach of Michael Porter [4], a pioneer in this field of research, who used the same features in his working definition: a cluster is "a form of a network located within a certain geographic territory; the close proximity of companies and institutions ensures certain forms of commonality and increases the frequency and impact of competition and cooperation."

Different combinations of these features may appear in different situations; nevertheless, it does not mean that one can speak about a well-developed cluster as a special form of economic organisation.

For instance, close territorial location and the homogeneity of activities (specialisation) were wide spread in the Middle Ages; a good example is the guild system of manufacturing. But the guild system is characterised by never-changing production methods. Therefore, it is important to consider all features of a cluster in the aggregate. This idea conforms to the approach suggested by Claude Ménard [14] for the explanation of the phenomenon of hybrid institutional set up.

Researchers also emphasize the difference between clusters and industrial regions, since in the latter case technological interdependence of enterprises is supplemented by the scale and flexibility, but not by innovations as in the case of clusters [12].

This leads to a number of methodological questions that are directly related to the difference between clusters and networks, and clusters and hybrids. Moreover, theoretical study of the cluster phenomenon can make use of the terminology of different economic theory research programmes, the comparison of which is given in [8]. In particular, one could apply the neo-Austrian variant, which includes such components as competition, entrepreneurship, tacit (personal) knowledge, etc. Different approaches to the research on one and the same research object can show differences and similarities of these approaches, but they hardly allow us to make more or less unambiguous operational conclusions concerning the nature of clusters, their development, or their different forms.

There is also a tendency to explain clusters in the framework of the new institutional economic theory or, more precisely, by means of the instruments of the transaction cost theory, which, in our opinion, has certain advantages: it ensures a satisfactory combination of operationality and feasibility. In this connection, we will consider the most crucial peculiarities of the suggested approach and show opportunities of interpreting clusters in terms of hybrid institutional agreements.

2. The comparative analysis of discrete structural alternatives

We do not take on the task of analysing the elements of the transaction cost theory that help to explain the emergence of different forms of economic organisation. Some authors [6; 9; 10] analyse this issue. We will only mention that alongside the transaction as an element of analysis, the contract approach and the principle of cost minimisation as the fundamental positive research principle (implying possible normative conclusions), there is also a comparative analysis of discrete structural alternatives. This comparative analysis emphasises not only the behavioural characteristics of economic entities (for instance, opportunism, limited rationality, etc.), but also the peculiarities of the assets employed (first of all, their specificity).

2.1. A weak form of selection

The comparative analysis of discrete structural alternatives is based on a comparison between merely feasible forms rather than on the ideal form of economic organisation (in terms of the expected results). In this connection, two features seem to be extremely important.

Firstly, since the existence and establishment of 'ideal' institutions is assumed to be impossible, there is no ideal form of economic organisation, in terms of its compliance with the efficiency criteria (the "first best" principle).

Secondly, one can develop such a form of economic organisation that, under given conditions, may prove to be better than all previously known so far. However, it does not make this form ideal.

Thus, one can speak about the selection of imperfect structural alternatives that have not only relative advantages, but also disadvantages. Every advantage and disadvantage will be of different importance depending on the conditions the given structural alternative is implemented under. The importance of this point is based on the fact that a cluster, being a special from of economic organisation, cannot be considered as a mere buzz word; it is a form that, provided the observance of certain conditions, can ensure, for the parties concerned, profits at least equal to those of other organisational alternatives.

2.2. The key dimensions of the comparative analysis – the basic characteristics of transactions

According to research traditions in this field, which are rightfully considered to be established by Oliver Williamson, the key features of transactions, crucial for the determination of an adequate mechanism of transaction management, providing for the minimisation of transaction costs (more precisely, the minimisation of the sum of transformation and transaction costs) are recurrence, uncertainty, and specificity of resources.

Economic literature most comprehensively analyses resource specificity, which helps to explain the transition between the main forms of institutional agreements: a market, a hybrid, and a company [6].

The main thesis resolves itself in the following statement: since resource specificity means a fundamental transformation of contractual relationships (due to the conversion of the *ex-ante* competitive relations into the *ex-post* mutual dependence aimed at limiting the opportunities of the contractor to use information), contractual precautions become necessary. These precautions become the instrument that connects and limits the freedom of contracting parties. It provides for a greater stability of the contract and a higher probability of the fulfilment of contractual obligations.

Unlike specificity, the uncertainty of resources is important not only on its own but also depending on whether the resource is specific, or not. In other words, if one uses a general resource, the low, medium, and high level of uncertainty does not affect the selection of the best structural alternative, which, in this case, will be the price mechanism and the corresponding method of adaptation to changing conditions – the atomistic one. At the same time, even a low level of resource specificity can bring about a situation when any increase in the level of uncertainty may provoke the transition from the price mechanism to hybrid forms; the transition from the trilateral to bilateral mechanism of conflict management is possible in the framework of a hybrid. The resource idiosyncrasy (the extreme case of specificity) can result in the employment of a bilateral or even unilateral mechanism of transaction management despite a relatively low level of uncertainty.

Finally, when considering transaction frequency, one can notice a certain analogy with the level of uncertainty, since general resources are used in the framework of the price mechanism, regardless of transaction frequency, while resource specificity "allows for" the transaction recurrence factor, which is connected to the transition costs in the situations that require stable interaction between transaction participants.

2.3. The basic parameters – limited rationality, opportunism, and resource specificity

It is important to mention that in the new institutional economics, the basic parameters of contractual form comparison also include resource specificity, while other parameters are related to the behavioural characteristics of economic entities, i.e. motivation (opportunism) and information (limited rationality) ones.

These parameters help to determine the key characteristics of contractual processes and transaction management mechanisms that are most suitable for the organisation of corresponding transactions.

3. Hybrid institutional agreements

This article pays special attention to hybrid forms; this interest cannot be explained by the fact that hybrid forms seem to be most thoroughly examined and compared to other structural alternatives in the framework of the new institutional economics. The real reason is that there is a good reason to consider clusters in terms of hybrid institutional agreements. This conclusion enables us to give a definition of a hybrid, combining the formal legal independence of transaction parties (unlike the economic form) and the *de facto* interdependence (unlike the market or price mechanism). Indeed, in the case of a hybrid, the parties reserve the so-called 'final' (residual property) rights – an important criterion of determining the holder of the property right in the cases when the contracts cannot be qualified as complete ones. At the same time, there is certain interdependence between the participants of a hybrid – it is an opportunity to earn a quasi-rent from such an agreement.

This is clearly seen in such elements of contracts as the scale and methods of resource pooling, but also in the mechanisms of adaptation to changing conditions (including the unforeseen, *force majeure* ones) and the mode of competition between the participants of the process. Before considering these aspects of hybrid institutional agreements, it should be mentioned that the combination of strong stimuli connected with the preservation of a relevant symmetry in the distribution of the residual property rights and the equality of the parties are the key features of hybrids. However, these key features do not indicate particular advantages or disadvantages of this organisational form. In the situation of a minor uncertainty in the external environment, hybrids are more efficient, since these features turn out to be advantageous. But even a slight increase in uncertainty reveals the fragility of this structure due to the emergence of either centrifugal tendencies (the dominance of strong stimuli) or centripetal ones (strong stimuli are eliminated in order to retain the possibility of collective adaptation to changing conditions and to ensure the equality of the parties).

3.1. The pooling of resources

The pooling of resources is directly linked to three interdependent problems: the selection of contractors, planning and the disclosure of information.

The peculiarity of the contractor selection mechanism results from the fact that the equality and comparability of parties is of importance for institutional agreement forms. How can this comparability manifest itself?

Firstly, it can manifest itself in the skills and competence of the staff that are crucial for an efficient exchange with the contracting organisation. Secondly, it can be observed in the organisation of information processes, friendly to the contractor; it allows the contractor to decrease the potential conflict of ex-post relations, since the contract is already concluded. Thirdly, it can be noticed in the process of decision making that enables a better understanding of the contractor.

Informal relations in the network allow its members to increase comparability and equality of the parties in a cluster. In this connection, the results obtained in the survey conducted in 2009 are of great interest. Table 3 shows different forms of interaction with competitors - those based on the desire to be engaged in certain forms of cooperation and on the established methods of cooperation. It is worth mentioning that this general example did not include representatives of the authorities and education institutions (the total number of interviews was 32; 20 interviewees represented the mechanical engineering sector, and 12 – the IT sector).

Table 3

Forms of cooperation with competitors (%)

Cooperation forms	Mechanical engineering		IT industry	
	Use this form	Are ready to use	Use this form	Are ready to use
Exchange of information on production technology	25.0	35.0	41.7	25.0
Exchange of information on the existing demand	40.0	20.0	33.3	8.3
Sharing experience in the application of management technologies	40.0	30.0	41.7	41.7
Cooperation in the framework of separate business projects	35.0	30.0	66.7	25.0
Joint programmes aimed at training and advanced training	10.0	40.0	33.3	41.7
Joint use of assets (buildings, installations, transport infrastructure, information databases)	10.0	35.0	16.7	33.3
Joint use of R&D	10.0	35.0	0.0	33.3
Joint development of propositions about the economic policy improvement	40.0	25.0	8.3	25.0

Source: the survey results.

The respondents hypothetically considered almost all the mentioned types of interaction as applicable both in the IT and the mechanical engineering industries. Though, in practice, multilateral cooperation is a rare occurrence. It is especially apparent in the mechanical engineering sector, where cooperation is often limited to information exchange on the existing market demand, the exchange of experience in management technologies, as well as cooperation aimed at the improvement of the economic policy. At the same time, the IT sector companies efficiently cooperate with competitors in the framework of separate business projects, which can be considered as an additional sign of cluster relations.

In the context of the pooling of resources, 'planning' means, first of all, a coordinated rather than independent elaboration of the companies' plans, which certainly implies a preliminary information exchange. Thus, a built-in stabilisation mechanism develops in the hybrid, thus decreasing environment uncertainty for each participant as a result of the formation of realistic expectations about the plans of other agents.

It is important to address the issue of joint planning, performed by the cluster members, being located along the same process chain, or in related, but not connected by main technological processes sectors (for

instance, those providing for the functioning of independent companies) and the market participants producing the same product and competing in the same market.

As it was mentioned above, information disclosure is an important method of joint planning in the activity of independent companies. But the problem of the disclosure of information also arises during the plan implementation process. It is especially important under the conditions of a) predictable but highly probable events (see the description of incomplete contracts); b) non-specified ex-ante events. In this case, there emerges the problem of collective adaptation to the changing environment, which requires information exchange and, consequently, information disclosure for the adjustment and harmonisation of all plans.

3.2. Contracting mechanisms (adaptations)

This section focuses on an important issues - the mechanism of adaptation to unforeseen ex-ante circumstances when addressing the third independent party is as counterproductive as the use of administrative mechanisms of decision making. On can speak about such a method/mechanism of conflict management that allows each party to retain its independence in decision making (unlike hierarchy) and to hear the arguments of each other as well as formulate new obligations. Long-term contractual relations with suppliers are believed to be an indirect proof of the presence of such adaption mechanisms (see Table 4):

Table 4

Period of company-main supplier cooperation, %

Cooperation period	Mechanical engineering	IT sector
Less than 1 year	5.0	16.7
From 1 to 5 years	25.0	33.3
More than 5 years	70.0	41.7

The prevalence of long-term connections is an important feature of hybrid institutional agreements, even if contracts are concluded for only 1 year: there are mechanisms of agreement prolongation that provide for the reproduction of an institutional agreement in a chain of operative contracts.

3.3. Competition mechanisms

We should mention that in the framework of the contracting and resource pooling mechanisms, one can speak of hybrids in terms of both vertical and horizontal connections between companies, whereas competition mechanisms are mainly reserved for competitors. It is important to emphasise this circumstance, since the simplified approach to anti-monopoly regulation of intercompany relations within a certain market (in this case, it is a market, limited in terms of the product and its geographical location) can reduce the innovative potential and competitiveness of these companies.

At the same time, the analysis of the peculiarities of the mechanisms of competition between the participants of hybrid institutional agreements is more likely to answer the question why the contemporary complex forms of economic organisation can be innovative and become innovative, while earlier forms could not and did not.

It is important that companies can compete in the resource markets. Hybrid agreement forms bring about the discussion of such aspects as the regulation of staff drain from one company to its rival company in a given product or service market. One can quote an interview with a representative of a Nizhny Novgorod IT company:

A cluster means that people get together and want to achieve the same goals. For instance, everybody who works for our company cannot move to another company in the cluster without reaching an agreement with all the parties concerned. If you want to 'buy' my employee, you are welcome, just pay. It's like buying a football player".

The football metaphor describes only the drain of key specialists, not ordinary company employees.

3.4. Hybrid typology

For a more comprehensive understanding of the forms of a hybrid organisation that qualify for a cluster, we should take a look at some peculiarities related to other hybrid forms: franchise chains, strategic alliances, and partnerships.

A franchising chain is a hybrid form that has a supervising core (with a delegated and non-delegated right to supervision and use of sanctions in case of a breach of internal rules); it is also characterised by legal relationships over the use of product differentiation techniques, for example, trademarks (see [7] for further information on different forms of franchise chain organisation).

A strategic alliance is a hybrid form characterised by the participation of companies that compete at the same stage of value creation, but, at the same time, pool resources to respond to common strategic challenges [11]. Unlike franchise chains, these contracts are not horizontal, though neither a strategic alliance, nor a franchise is obligatory attached to a certain territory. For example, it does not make any sense to speak of the McDonald's franchising chain in California or France. This system is apparently transnational and united by one trademark.

It is not a coincidence that we mention partnership in this connection, though it is considered to be a form of business enterprise organisation. The reason for classifying partnership as a hybrid [13] - although it is closer to the hierarchical organisational form than, for instance, an alliance - is that several participants, managing partners, have residual property rights (though, de facto this can vary). It is worth mentioning that the partnership is characterised by a narrow specialisation (which is related to the peculiarities of the stimulus structure) and optional territorial attachment (KPMG, PWHC, Ernst&Young are partnerships that enjoy the world presence status). These examples show that there are reasons to consider a cluster as a hybrid form that cannot be reduced to another (other) form(s) of institutional agreements.

There is an approach, where clusters are understood as interorganisational rather than intercompany networks [11]. This is related to the fact that a cluster, according to the advocates of this approach, also includes authorities of different level. It is difficult to imagine a contemporary innovative cluster without a university, though this participant has the status of a non-profit organisation. But in this case, the most important factor is not the organisational and legal form, but emerging mechanisms of transaction management that allow to consider universities being similar to firms. At the same time, special functions of education centres and different authorities (especially, for growing clusters) make it necessary to take into account the peculiarities mentioned above.

4. Cluster as a special form of hybrid institutional agreements

Taking into account the descriptive characteristic of a cluster given in the article, as well as the analytical characteristics of hybrid institutional agreements, one can speak of clusters as a type of hybrid institutional agreements. As a rule, these agreements exist in the form of a network of bilateral and multilateral contracts between companies, which, due to their location and specialisation, are more likely to get involved into recurrent economic exchange than companies from non-related industries situated at a considerable spatial (in the economic sense) distance. Having said this, it is important to explain the significance of the resource specificity factor defining which type of specificity dominates in a certain cluster.

Indeed, cluster companies compete for resources, first and foremost, for qualified labour force, having certain skills and knowledge. This resource can be efficiently used in several companies, which, in its turn, requires the elaboration of HR policy standards so that the competition for resources would not result in a banal price war (but, unlike a product market - a war for a rise), or headhunting negatively affecting companies' finance. This problem was described in an interview with a representative of a Nizhny Novgorod IT company:

"To put it mildly, our standards of living are a little bit lower than in Europe, so people here should be satisfied with the little of little of life compared to Europeans. All in all, the situation (with remuneration – A.Sh.) *is awful… the strategy of 'pulling over' the personnel led to all this. In three years, you can increase your salary fivefold moving from one company to another".*

Another important aspect is related to territorially-specific resources, which include relations with regional and local authorities that can create favourable conditions for the development of a cluster, or inhibit it, depending on the stimuli determined by the institutional environment (including the degree of business-authority independence). This aspect really matters in the context of the so-called territorial competition [10].

Companies in a cluster can make use of the so-called external economy; the production costs within the given territory turn out to be lower than within the adjacent ones. It results from the opportunity to save on the economic and geographical distance, specialisation and, of course, to considerably save as a result of a more intensive flow of innovations (not only those related to the product and technology, but

also organisational ones, which requires sufficient stimuli to experiment). Accumulative innovations are more likely to be found in clusters than beyond them.

Finally, a separate question: how are regional and local authorities (local government bodies) and knowledge generating institutions (first of all, education and research institutions) included in the structure of multilateral intercompany connections in related industries? This question will be considered in the following sections of this article.

5. Cluster typology

Researchers highlight a considerable diversity of clusters. This diversity affords ground for doubt that business practices and practical decision making at the level of public administration (concerning the development of clusters, or the support of cluster initiatives) can be relied on the representative cluster principle, which is based on the detailed description of necessary, but not sufficient characteristics. Sufficiency is guaranteed by the 'territorial attachment'; the territory, in its turn, implies the determination of cluster specificity in accordance to the eligibility criteria. Thus, the problem of cluster typology is usually considered as a separate issue.

5.1. Cluster classification criteria

The most important criteria of cluster classification are determined on the basis of those features of hybrids that are related to the multiplicity of relations, spatial location, and the temporal aspect of relations in the given hybrid form. Three criteria should be considered in this connection:

— presence of the core or the centre of a cluster;

— localisation of connections between cluster members;

— mechanisms of cluster formation and development.

This approach is based on the research results presented in [15]. As it is mentioned above, this formulation of the problem brings a separate question about possible roles of authorities and research/education centres. According to some researchers on networks [11], these roles make intercompany networks differ from interorganisational ones.

5.2. Classification based on the core (centre) criterion

Since hybrid institutional agreements cannot be only bilateral but also multilateral ones (in terms of an intercompany network), there arises a question whether there is a core the agreements concentrate around. According to this criterion, clusters can be divided into centred and non-centered ones. The main feature of centred clusters is that one participant determines the existence of the cluster. Other elements of the cluster play a less important role, and their appearance or disappearance hardly affects the characteristics of the cluster. None of the elements of a non-centered cluster is a determining one and, consequently, idiosyncratic in its relation to the aggregate of agreements that constitute the cluster. It is obvious that borderline cases characterised by a core/centre, consisting of more than one element are also possible; there arises a question about the peculiarities of interrelations between the elements of the core.

There are several different variants that can be used for the empirical identification of a cluster, as well as for developing methods of public support, or elaborating the companies' business strategies:

1. The accumulation and analysis of information on the emergence and development of the cluster that can define its role in the reproduction of each element;

2. The analysis of the structure of formal and non-formal agreements that constitute the cluster;

3. The quantitative assessment of each cluster element in comparison with the general scale of activity of the cluster as such.

The second variant is preferable, since it can help to determine the elements that are significant in the present and will be significant in the future, at least, within the time period set by the corresponding agreements.

For the research on centred clusters, the understanding of their distinction from firms is of great importance. Let us recall the definition of the firm: it is a network of long-term bilateral agreements between the entrepreneur (the central agent that also owns specific assets) and the resource owner. According to the network configuration, both parties are given a number of rights (relative property rights) that afford ground to consider the given structure as a firm with the corresponding hierarchical mechanism of transaction management. There is no upward responsibility delegation in the firm, since the distribution of authority between the organisation participants is not cyclical. Otherwise, it would be

difficult to avoid the multiplicity of agents enjoying residual property rights that are important for transactions

The aerospace cluster that formed around the Boeing Company can be cited as an example of a centred cluster; other examples being the software industry and Microsoft Corporation [15, p. 6], Finnish ICT industry and Nokia [11]. Interviews with representatives of the Russian motor industry show that the respondents consider a cluster being a centred system:

"In my opinion, a cluster (in the motor industry) is an open system formed around a large assembling enterprise; it allows, on the one hand, to achieve synergy (joint functioning of organs and systems in a living organism), between smaller member-enterprises within the cluster. On the other hand, this open system provides the most efficient logistics for the assembling company. There is a certain core in the cluster; in this case, it is the assembler. There are also secondary elements – suppliers. A cluster is similar to the Solar System; although there appear other elements of synergy and maximum efficiency as well as higher quality, typical of the system's core".

The second level of the centred cluster classification, which is related to the characteristics of the centre (i.e. whether the company is public or private), might be important for Russian economy. In particular, it can be significant for the companies that form the core of a cluster in the military industry.

5.3. Classification based on TEH connection localisation criterion (in contrast to spatial localisation)

This criterion shows the spatial scale of contractual relations of the cluster members with their product consumers as well demonstrates the localisation of relations between members of the cluster. For example, the manufactured product can be mainly consumed on the territory of the cluster, or be delivered beyond this territory. In other words, this classification is primarily based on the characteristics of final links of contractual chains.

If a company operating at the global level (such as Microsoft or Boeing) places orders with firms situated in close vicinity to each other, while the company itself is distantly located, then the cluster represents a satellite platform of the parent company in the value chain. Strictly speaking (in accordance with the above-given definition), the parent might not be a part of the cluster.

Localisation of connections is related to the phenomenon of economic distances that are defined not only by the geographical remoteness of one economic agent from another, but also by other factors, including transport network density and the legislation regulating all movement within the territory. The latter case concerns visa and customs regime that limits the opportunities for spatial movement of goods and resources. At the same time, borders are not an insurmountable obstacle for cross-border cluster development. Such –cluster – a tourism one - has apparently formed in the Kaliningrad region and in the border areas of the neighbouring countries, first of all, Poland and Lithuania. Close cooperation between tourist agencies of the Kaliningrad region, Poland, and Lithuania as well as the popularity of cross-border tourist routs, the setting up of education centres training specialists in the field of tourism and industrial services (first of all, hospitality) prove that the cross-border cluster has already been developed.

5.4. Classification based on the development mechanism criterion

5.4.1. In the context of institutional agreement peculiarities

The development of a cluster 'from scratch' means that no predecessor has ever been located in the place. This variant is, most likely, an artefact, in the case of endogenous cluster development, although it is also possible when a cluster was formed as a result of an implemented economic policy.

Another variant is cluster formation on the basis of hybrid modification/development. In this case, diverse in their character and independent companies interconnected by simple (bilateral) contractual agreements gradually develop a wider legal framework by broadening the range of their activities, and by the emergence of new actors (resulting from a rather low entry barrier). These new actors - research and education institutions, authorities of different levels, local government bodies, financial institutions and other institutions promoting cooperation – may also be included into contractual agreements [16, p. 18].

The transformation of market relations as a possible scheme of cluster development means that companies initially had some connections that fit well into the structuring by the price mechanism. At the same time, an increase in transaction frequency and their growing complexity, as well as the opportunity and necessity of applying specific resources, lead to the application of mechanisms that require more

stable relations between the parties. These mechanisms would allow the parties to solve various problems connected with the internalisation of externalities during the localisation of relations between the interested parties (an example of such a shift in mechanisms under the influence of versatile factors see [8]).

Increasing flexibility of separate elements of the hierarchy may result in a partial disintegration of a firm; interdependence between different participants being still preserved, the stimuli of separate participants are strengthened. But in this case, the difficulty of cluster identification will lie in the fact that a considerable part of the cluster might still look like a separate independent company. At the same time, the gemmating of smaller competing companies from a bigger company is also a variant of cluster development, since a smaller company will have more opportunities to find qualified workforce and build its own clientele base.

The above mentioned variants of cluster formation seem to be ideal and can be considered for analytical purposes. However, they can rarely be met in practice. That is why it is important to turn to a combined variant of cluster formation that can include components of the above mentioned variants in different combinations and proportion.

5.4.2. Endogeneity and exogeneity

Endogenous clustering implies cluster formation without any deliberate support from authorities. According to this scenario, cluster formation is a side effect of recurrent economic exchanges between economic agents localed within a certain territory. These agents can neither radically affect the result, nor have any ex-ante intentions that could be related to the end result (formation of a cluster).

Under the current conditions, it is hardly possible to find a cluster, the development of which would not be affected by an economic policy. At the same time, since these economic policy instruments imply a different degree of state intervention in the economic exchange system, there is reason to speak of the exogeneity of cluster formation, if the state conducts the so-called dirigisme cluster policy [11, p. 217].

It is worth mentioning that external factors can also be important for cluster development. A good example is the furniture cluster in the Kaliningrad region. If in 1997, furniture was imported from Poland, in 2000, after the dramatic devaluation of the rouble, the number of craft furniture manufacturers drastically increased. Neither politicians, nor researchers paid any attention to the emerging cluster in furniture production [1]. In other words, the combination of the then Special economic zone regime with the changes in the macroeconomic conditions created an opportunity for a spontaneous formation of the cluster that should be probably ascribed to the category of non-centred ones.

Though the idea that clusters develop spontaneously is wide spread in economic theory (which explains the importance of cluster mapping), there are examples of deliberate cluster formation, as it happened, for instance, with the Sophia-Antipolis technology cluster that started to form in the last third of the 20th century and is now a developed cluster of companies, specialising in software and medical equipment production. We should mention that the trigger factor was the situation in the region, which unites 20 communes, where there was neither industry, nor university traditions, nor a dense social network.

There are two variants of state participation in cluster development: a full cycle support and a fragmentary support.

The first case implies that the state has a long-term plan of territorial development that allows for industrial specialisation and includes mechanisms of initial plans adjustment depending on ex-post circumstances. In this situation, the most significant conditions are those that are created for potential leaders, the engines of cluster development. One of Nizhny Novgorod respondents made the following conclusion based on the experience of their company branch in China:

"The government built an industrial park and leased an office to us at a token rent, understanding that we would hire people and these people will pay taxes in China. And we will pay taxes in the same region, and our employees will buy cars, accommodation, and use banking services".

The interviewee did not mention whether there was a tender and what the selection criteria were. Generally speaking, the issue concerns the stimuli provided by regional authorities are ready to work without illicit payoffs, thus creating favourable conditions for cluster development.

The following reaction of a regional official to the question about cluster formation seems to be the most typical:

"Now, the task is 'to create', because there are only first prerequisites for understanding clusters as 'engines' of territorial development (as it happens in other economies). We have assigned territories for the formation of each cluster, but there's still much to do. First of all, we need somebody from the real sector of the economy, who would act as the 'engine' of cluster formation; pure administrative methods are not sufficient. We need a leader that would trigger the formation of infrastructure, and we would support it. If we want to develop faster than others, if we want to rapidly achieve a higher production level and higher standards of living, comparable to those in many other countries, we should do that".

The latter case (see above) concerns occasional intervention of authorities in the development of a cluster (not of separate companies, or cluster segments depending on the location or industry).

The first variant means launching a cluster project, particularly by the elaboration and promotion of cluster initiatives with a further weakening of attention to cluster development. The above given quotation characterises the first variant, at least, in terms of the initial stage of cluster development.

The second variant is providing support to an established cluster, and further adjustment of its development through different economic policy mechanisms. In this case, cluster mapping becomes an important element.

We should mention that sometimes the development of a cluster can be more complex and sustainable, when the policy of the authorities of several regions, or even of several regions of different countries, is coordinated. The latter case concerns the formation and development of trans-border clusters, when trade relations between the neighbouring countries, including cross-border trade, transform into more complex relations of industrial cooperation; it means not only intensive information exchange and sharing best practices, but also coordinated planning and resource pooling for the solution of common economic problems.

Conclusions

1. Clusters are characterised by the following mutually complementing features: spatial location; belonging to technologically related industries; close multilateral connections within the cluster, not only technological, but also legislative ones; competition between companies, operating in the same market.

2. Clusters can be explained in terms of the new institutional economics, if they are considered as a special form of hybrid institutional agreements.

3. There are numerous classification criteria that allow not only the distinction of clusters, but also the retrospective and perspective assessment of the interdependence between cluster development and the implemented economic policy.

4. A separate issue for further research is whether there is sufficient reason to speak of a completed cluster formation, if hybrid forms of territorially localised institutional agreements between companies situated along the same process chain and at the same stage of production process (including research centres) have been identified.

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